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A Time Study of Direct Nursing Care Given to Selected Premature Infants of Varying Weights

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A TIME STUDY OF DIRECT NURSING CARE GIVEN TO SELECTED PREMATURE INFANTS OF VARYING WEIGHTS

by

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A Time Study of Direct Nursing Care Given to Selected Premature Infants of Varying Weights

Thesis directed by Assistant Professor Betty L. Highley.

The problem of this study was to determine whether the direct nursing care of premature infants of different weights varied as to the number of nursing activities performed and the amount of time utilized for these activities in relation to the weight of the infant.

An analysis of the direct care revealed approximately 32 per cent of the total time spent in general body care and over 50 per cent spent in feeding. Mean times determined for the separate categories revealed no apparent relationship between time spent and weight of infant. Each category seemed to be influenced by the uncontrolled variables of age and condition of infants.

When used alone, the weights of infants appeared not to be a good index for determining direct nursing care needs. As the weights of infants increased, there was no general pattern of increase or decrease in the mean number of nursing activities performed, the mean times for total direct care and individual categories of care, or the percentage of total time utilized in each category. The weight groups which had high mean times for total direct care also had high mean times for the category of feeding.

Recommendations were made that when determining direct nursing care needs, the age, condition, and weight of infants be considered

jointly and that further studies be done controlling all three factors. A further recommendation suggested that feeding needs of prematures be studied to determine whether they would be a suitable index for determining direct nursing care needs.

This abstract of about 250 words is approved as to form and content. I recommend its publication.

Signed Betty L. Highley
Instructor in charge of thesis

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I wish to express my sincere appreciation for the constructive criticism and encouragement received from

Betty L. Highley, Assistant Professor of Nursing

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CHAPTER I

INTRODUCTION AND STATEMENT OF PROBLEM

As other causes of infant deaths are reduced, prematurity becomes a more important factor for consideration in the reduction of neo-natal deaths. "Premature birth takes a higher toll of infant life than any other condition, and it is one of the leading causes of death among the general population."[1] In 1950, 7.4 per cent of the infants born in the United States weighed under 2500 grams (5 lb. 8½ oz.).[2] Premature infants are responsible for almost 50 per cent of the deaths occurring during the first year of life.[3]

"A premature baby's life may depend upon whether or not the person who takes care of him has the knowledge and the skill needed for the care of such infants."[4] Nursing personnel who give constant twenty-four hour nursing care to the premature infant are in a vital position to help save his life.

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[1]Ethel C. Dunham, Premature Infants, A Manual for Physicians (second edition; New York: Harper and Brothers, 1955), p. 342.

[2]Alfred Yankauer and others, "Institutes for Physicians and Nurses in the Care of Premature Infants," Pediatrics, 18:95, July, 1956.

[3]E. Stewart Taylor and Harry H. Gordon, "The Premature Infant Program in Colorado," The Mother, Quarterly Bulletin of The American Committee on Maternal Welfare, United States Children's Bureau (Washington: Government Printing Office, October, 1948), p. 1.

[4]Margaret Losty, "To Improve the Nursing Care of the Premature Baby," The Child, 14:159, April, 1950.

The skill and judgment the nurse uses in making her observations about the premature infant and in communicating these observations to the physician contribute to decisions made concerning the medical supervision of the infant. Within the framework of medical orders, the nurse adapts the nursing care to the individual infant. From her constant alertness and discerning observations, the nurse reports such symptoms as generalized cyanosis, respiratory difficulties, unstable temperature, lethargy, and hyperactivity which may be some of the first symptoms of illness.[5] Based on her knowledge of the physiological development of the premature infant and each individual infant's pattern of development and needs, the nurse uses her judgment to adapt the nursing care, for example, determining the appropriate method of feeding to use at a particular time or decreasing the amount of formula to be given in the presence of feeding difficulties.

The premature baby, whose life may depend upon the skill of the person caring for him, is an individual. His individual needs indicate the care he needs.[6] Fulfillment of these needs takes a certain amount of time.

In planning for the nursing service care of premature infants, more scientific facts and studies are needed as a basis for care. It was hoped that the approach of the following study would provide

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[5]Esther Weidman Ott and Lula O. Lubchenco, "The Premature Infant's Reaction to Illness," The American Journal of Nursing, 57:1431-1432, November, 1957.

[6]Doris Green, "Caring for the Premature Baby," The American Journal of Nursing, 50:458, August, 1950.

tangible data on which to base the planning for nursing care to meet the needs of the premature infant.

I. THE PROBLEM

Statement of the problem. The problem of the study was to determine whether the direct preparation for and the direct administration of nursing care to premature infants of different weights varied as to the number of nursing activities performed and the amount of time utilized for these activities in relation to the weight of the infant.

Need for the study. "To date, there has been no study on which to base the amount of nursing care required for infants of varying weights and conditions . . ."[7]

From the review of literature and studies that had been conducted on premature nursing care, the following quotation was taken from a report on the Colorado Premature Infant Care Program:

> These standards Children's Bureau and American Academy of Pediatrics have not been tested under a variety of conditions or in different situations to determine the amount of graduate professional nursing service and/or non-professional nursing services needed to provide adequate service for infants of varying weights and ages, i.e., the amount of expert specialized nursing service needed in the first twenty-four hours . . .[8]

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[7]American Academy of Pediatrics, Hospital Care of Newborn Infants (Standards and Recommendations for Full-term and Premature. Evanston, Illinois: American Academy of Pediatrics, 1957), p. 53.

[8]Denver Regional Staff, United States Children's Bureau, Program Review-Colorado Premature Infant Care Program (Denver, Colorado: Eighth Regional Office, United States Children's Bureau, 1950), p. 54.

> Efforts will be made by actual study to determine the number of hours of nursing care required to meet these goals for each infant as part of the project . . . [9]

Studies to determine the nursing care requirements for premature infants are being planned. Until their completion, standards and recommendations have been made from observations and experience in premature centers throughout the country.[10]

Purposes of the study. The purposes of this study were: (1) to determine if there were differences in the number of nursing activities performed while giving bedside nursing care to premature infants of varying weights; (2) to determine the amount of time spent in performing these nursing activities in relation to the specific weight of the infant; and (3) to make recommendations based on the data which could be used as one index in determining the number of nursing care hours needed by premature infants of varying weights.

Assumptions. The assumptions underlying this study were:

1. Specific nursing activities can be observed and measured in time and number.

2. In a premature center the nursing care needed by each infant would be provided by the nursing personnel.

3. All of the nurses observed giving the nursing care had been

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[9] Ibid., p. 12.

[10] American Academy of Pediatrics, op. cit., p. 53.

oriented to the procedures as outlined in the Nursery Procedure Book.[11]

4. The smaller the infant, the greater the incidence of immaturity and increased occurrences of infection, respiratory, and feeding difficulties.

Hypotheses.

1. There is no difference in the number of nursing activities performed while giving care to premature infants of varying weights.

2. There is no difference in the amount of time spent in performing the nursing activities while giving care to premature infants of varying weights.

Scope and limitations of the study.

1. The study included observations made in one Premature Center, located at the University of Colorado Medical Center.

2. The study was based upon 138 individual observations of nursing care given to twenty different infants.

3. Infants weighing between 750 and 2000 grams were studied.

4. Weight was the only criterion used for selection of infants.

5. The infants to be observed could not be selected ahead of time.

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[11]Department of Nursing Service, University of Colorado Medical Center, Nursing Procedure and Policy Book for Newborn and Premature Nurseries (Denver, Colorado: University of Colorado Medical Center, 1955), pp. 1-80.

6. The observations were made from June 5, 1959 to June 25, 1959.

7. The study was limited to observing graduate nurses, of different abilities, skills, and experience, providing the nursing care for the selected infants.

8. The staffing pattern of the nursery was neither evaluated nor controlled.

9. The observations were made by the investigator of the study. The observer was the nursing supervisor, a fact that may have had some effect on the method by which some of the procedures were performed, which in turn may have affected the number of activities performed and the time expended.

10. Variables which limited the study were the conditions of infants admitted to the Premature Center, their ages, and the number of smaller infants cared for in one nursery.

11. The Premature Center was not necessarily typical of all nurseries caring for premature infants.

Numbers seven through ten were uncontrolled variables, some of which might have been controlled if the study had been continued over a longer period of time.

II. DEFINITION OF TERMS USED

For the purpose of this study, the following terms are defined:

Cardinal principles of care. The nursing activities to be observed were selected on the basis of the principles of premature care

generally agreed upon by experts. The principles were: (1) discriminating observation, (2) prevention of infection, (3) maintenance of body fluids and nutrition, (4) control of body temperature and respirations, and (5) psychological care as demonstrated by holding, patting, rubbing, and talking to the infant.

Nursing activities. Elements of a function--nursing care--are defined by Tead as "A body of duties closely related in homogeneous character and in operational similarity . . ."[12] For further identification of the nursing activities see Appendix A.

Nursing care. Those nursing activities, listed on the check list, which were performed in preparation for and the execution of nursing care at the bedside of the infant.

Premature infant. Any infant, born prematurely or at term, whose birth weight is at or below 2500 grams.[13]

Premature Center. A nursery located in a medical institution, functioning as an educational and research center, and designed in terms of staff, equipment, and purposes to care exclusively for premature infants. For further description of the Center, see Chapter III.

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[12]Ordway Tead, The Art of Administration (New York: McGraw-Hill Book Company, Inc., 1951), p. 102.

[13]Evelyn C. Lundeen and Ralph H. Kunstadter, Care of the Premature Infant (Philadelphia: J.B. Lippincott Company, 1958), p. 1.

Other terms related to specific nursing procedures, such as suctioning, will be defined in Chapter IV.

III. SUMMARY

A premature infant's life may depend upon the type of nursing care he receives. The knowledge, skill, and judgment used by the nurse to administer care to the infant and to observe and report the condition of the infant and his responses to medical and nursing care are factors vital to his survival.

The premature is an individual and his needs indicate the type of care he should receive. Fulfillment of these needs takes a certain amount of time. At present, there are no studies available on which to base the amount of nursing care required for premature infants of varying weights. The following study was undertaken for the purpose of providing tangible data on which to base the planning of nursing care for premature infants of varying weights.

Differences among the number of activities performed and the amount of time utilized by these activities, while giving nursing care to premature infants of varying weights, would indicate that the factor of weight may be used as one index in determining the amount of nursing care hours needed for premature infants.

CHAPTER II

REVIEW OF THE LITERATURE

A review of the nursing literature revealed few articles which discussed the relationship between the size of the premature infant and the amount of nursing care given or required.

A survey was made of the nursing literature as follows: The American Journal of Nursing, 1949 to 1959, Nursing Outlook, 1953 to 1959, and Nursing Research, 1952 to 1959.

From the survey, twelve articles written on the care of premature infants were found; five of the articles dealt with the nursing care given to these infants in the hospital.

Selected articles were reviewed from the following periodicals: (1) Hospital Progress, (2) Journal of the American Medical Association, (3) Journal of Pediatrics, (4) Modern Hospital, (5) Pediatrics, (6) Public Health Nursing, (7) The American Journal of Diseases of Children, and (8) The Child.

The majority of authors of the selected articles related their discussions of nursing care to the cardinal principles of: (1) prevention of infection, (2) control of body temperature and

respirations, (3) maintenance of body fluids and nutrition, (4) constant observation, and (5) psychological care.[1]

Rubbelke discussed the physical handicaps of the premature infant and related the aims of nursing care and nursing procedures to these handicaps. From this article, the following conclusions were drawn: the more immature the infant, the more skillful nursing care required, and the more frequently nursing activities are likely to occur. The physical handicaps and their implications for nursing care were as follows: (1) The infant's inadequate temperature control will require adjusting the incubator to meet the infant's need; (2) Poor development of the respiratory apparatus will necessitate frequent suctioning and clearing of the airway, and providing oxygen and artificial respiration as indicated; (3) An inadequate gastro-intestinal tract requires providing a form of nutrition that can be easily assimilated, and a method and frequency of feeding suitable to the infant's needs; (4) The infant with thin and delicate tissues, which bleed easily, and with sweat glands that do not function properly will need gentle handling and positioning from side to side; (5) The low energy reserve and low convulsion threshold of the infant necessitate giving all the care at

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[1]Aileen Hogan, "The Premature Baby," The American Journal of Nursing, 54:576-577, May, 1954; Evelyn Lundeen, "Prematures Present Special Problems," Modern Hospital, 82: 61-64, April, 1954; Leona Baumgartner, "Nation Wide Plan for Reduction of Premature Mortality," Journal of the American Medical Association, 146: 893-901, July, 1951; Henrietta Marquis, "When a Premature Baby is Born," The Child, 14:150, April, 1950; Sister Marita Ann, "Nursing Care of the Premature Infant," Hospital Progress, May, 1954, pp. 116-118; and S. Z. Levine and H. H. Gordon, "Physiological Handicaps of the Premature Infant," The American Journal of Diseases of Children, 64:299, August, 1942.

once and avoiding undue handling of the infant; (6) The infant's low resistance to infection requires individual care and rigid aseptic techniques; and (7) Prematures are susceptible to anemia, and blood loss should be prevented by not cutting the cord until the pulsation has stopped.[2]

In their discussion of nurses' observations on premature infants, Ott and Lubchenco described the development and use of a check list used by the nurses working in a Premature Center.[3] From the use of this tool and from further study, there was an indication that the smaller infants received more checks on symptoms of cyanosis, respiratory difficulties, regurgitation, and lethargy or hyperactivity.[4] These symptoms are closely related to the need for constant observation and skilled nursing care.

In the medical texts written on premature care, handicaps similar to those stated by Rubbelke have been discussed. Dunham, Lundeen, and Kunstadter have written extensively on the significant factors related to the care of premature infants. The care necessary

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[2]Leona Rubbelke, "Hawaii Studies the Problem of Its Smallest Children," Nursing Outlook, 2:571, November, 1954.

[3]Esther Weidman Ott and Lula O. Lubchenco, "The Premature Infant's Reaction to Illness," The American Journal of Nursing, 57:1431-1433, November, 1957.

[4]Esther Weidman Ott, "The Study of a Nursing Observational Check List of Symptoms of Illness in Premature Infants" (unpublished Master's thesis, the University of Colorado, Boulder, 1957), p. 40.

for the infant has been related by each author to various principles, all of which fall into the five general categories specified as cardinal principles.[5]

A few of the authors contributed their opinions on what was necessary or "ideal" in terms of providing nurses for the premature infant. Lundeen and Kunstadter recommend one nurse for every five to six infants.[6] Marquis advised that there be one nurse available for every four infants, providing six hours of care in twenty-four hours as a minimum requirement. Marquis also said that the smaller infant needs more care.[7] The National League of Nursing Education recommended six hours of bedside nursing care during a twenty-four hour period for all pediatric patients.[8] There were no specific recommendations for premature infants. The American Academy of Pediatrics has written:

> The weight and condition of the premature infant are factors in determining the ratio of nurses to premature infants. In general, and pending further studies, it is suggested that a reasonable ratio

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[5]Ethel C. Dunham, Premature Infants, A Manual for Physicians (second edition; New York: Paul B. Hoeber, Inc., 1955), pp. 105-130; Evelyn C. Lundeen and Ralph H. Kunstadter, Care of the Premature Infant (Philadelphia: J.B. Lippincott Company, 1958), pp. 16, 37-38.

[6]Lundeen and Kunstadter, op. cit., p. 39.

[7]Henrietta Marquis, "When a Premature Baby is Born," The Child, 14:150, April, 1950.

[8]National League of Nursing Education, Manual of the Essentials of a Good Hospital Nursing Service (New York: National League of Nursing Education, 1936), p. 12.

should be one nurse to every five infants. This would provide approximately five hours of nursing care per infant. 9

The survey of Nursing Research revealed two studies on nursing care of premature infants. One study was a survey of programs of nursing care for premature infants in Premature Centers; the other study was on observations of feeding programs of premature infants.[10]

SUMMARY

The review of nursing literature revealed few articles written on the nursing care of premature infants. Fewer articles have been written which discussed the relationship between the weight of the infant and the amount of nursing care given or required.

In general, the articles on premature care found in the nursing and medical literature indicated the importance of basing the nursing care upon the handicaps of prematurity and their relationship to the weight, age, and condition of the infant.

The search revealed two studies on nursing care of premature infants. Studies that test the nursing care and its relationship to the weight of the infant have not been done. Many authors indicated the need for such knowledge.

9American Academy of Pediatrics, Hospital Care of Newborn Infants (Standards and Recommendations for Full-term and Premature. Evanston, Illinois: American Academy of Pediatrics, 1957), p. 54.

10Sister Jean Wilfrid Jean, "Programs of Nursing Care for Premature Infants in Selected Premature Centers," Nursing Research, 5:81-90, October, 1956; and Sister Mary Charitas Iffrig, "Nursing Observations of 100 Premature Infants and Their Feeding Programs," Nursing Research, 5:71-81, October, 1956.

CHAPTER III

SETTING OF THE STUDY

I. HISTORY OF THE CENTER

In 1947, provision was made for the establishment of a premature unit at the University of Colorado Medical Center. Statistics had revealed a need for such a center, and the physicians in the State of Colorado agreed on a plan.[1] The original plan was submitted by the State Health Department to the Children's Bureau. Efforts were made to conform to the minimum requirements related to standards of care as recommended by the United States Public Health Service and the Children's Bureau.[2] The Center accepted the first premature infants for care early in 1948.[3]

The aims of the Colorado Premature Project were: (1) to supply a type of antenatal and delivery room care which would decrease the number of premature births and mitigate the risks of delivery; (2) to supply specialized nursery and follow-up care which would assure proper

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[1]Harry H. Gordon, "Some Facets of the Colorado Premature Infant Program," The Child, 14:152-154, April, 1950.

[2]Denver Regional Staff, United States Children's Bureau, Program Review-Colorado Premature Infant Care Program (Denver, Colorado: Eighth Regional Office, United States Children's Bureau, 1950), p. 3.

[3]Ibid.

emotional and physical growth for the infants who survived; (3) to teach personnel who would be able to initiate similar projects in their own hospitals and communities nurses, public health officials, medical students, and doctors ; and (4) to conduct further research studies related to the causes and prevention of prematurity.[4]

The Colorado Premature Center was equipped to care for twenty infants in the premature nursery with provision for six bassinets in the newborn nursery for larger premature infants born at the hospital where the Center is located.[5] The Center was designed primarily for care of infants born in the Denver area, but infants from other areas in the state might be referred for care. Referrals were made by physicians, other hospitals, or para-medical agencies. The only criteria for admission were that the home hospital had inadequate facilities for care of the infant or the economic circumstances of the family warranted the admission.[6] The Center received funds from the Children's Bureau through the Colorado State Health Department for

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[4]E. Stewart Taylor and Harry H. Gordon, "The Premature Infant Program in Colorado," The Mother, Quarterly Bulletin of the American Committee on Maternal Welfare, United States Children's Bureau (Washington: Government Printing Office, October, 1948), pp. 2-6; Harry H. Gordon and John A. Lichty, "Colorado Premature Infant Care Program," Rocky Mountain Medical Journal, 46:651-652, August, 1949; and Harry H. Gordon, "Some Facets of the Colorado Premature Infant Program," The Child, 14:152-154, April, 1950.

[5]Gordon, op. cit., pp. 153-154.

[6]Ibid.

assistance in hospitalization costs, research, education, and salaries of key people in the project.[7]

In 1950, the Program Review of the Colorado Premature Infant Program presented several conclusions which were related to the current study:

A. In addition to conclusions specifically related to this project, the review brought out certain facts which appear to have the following general implications for planning programs for premature infants and in comparing the effectiveness of different Centers:

1. The expected census of smaller, as compared to larger infants, will affect the total cost of the program, the duration of stay, the type of physical facility and equipment, and the type and number of professional persons needed.

2. A Center accepting outside referrals can expect certain variations from the typical caseload of infants born on its own delivery service. Expected characteristics of referred infants, according to this study were:

a. An unusual proportion of infants under 2000 grams.

b. A number of infants who had been cared for at least 48 hours and then transferred to the Center either because of anticipated cost or because they were not doing well.

. . . . . .

d. Infants who were born under a variety of obstetrical techniques and who have been born of mothers who have received varying amounts and kinds of prenatal care.[8]

B. The following conclusions were drawn in regard to the Colorado project:

. . . . . .

12. Nursing Service -- It would be highly desirable for the nursing service of the Colorado Medical Center to plan for and

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[7] Ibid.

[8] Denver Regional Staff, op. cit., p. 75.

> conduct a comprehensive study of nursing time devoted to care of premature infants and to draft conclusions so that other nursing administrators may have the benefit of this experience.[9]

The above statements describe the variations and characteristics of the population found in a Premature Center. The type of nursing care given to these infants was based on the variations and, therefore, was not typical of all premature nurseries.

II. SETTING OF THE STUDY

The Premature Center was divided into 2 eight-bed units and 2 two-bed isolation units where infants born outside the hospital were admitted until their culture reports indicated no infection. Other infants were also isolated in the two-bed units.

Approximately 85 per cent of the nursing care was given by graduate nurses. The number of patients assigned to a nurse varied with the census. However, the majority of the time the nurses were assigned to care for infants who were in the same room and possibly two other infants in an isolation unit. It was, therefore, possible to follow one nurse and observe all the care she gave to the specific infants selected for observation. Occasionally, while the nurse assigned to the selected infant was out of the unit for meal time, another nurse gave care to the infant. Of the infants assigned to one nurse, there were usually five to six being observed by the investigator for the collection of data during the current study.

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[9] Ibid., p. 78.

The infants selected for the study were cared for in Isolettes, incubators, or bassinets. The Isolette was an incubator with a Plexiglas hood, port holes for entry of the hands, and controlled humidity and heat regulators. The other incubators used were electrically heat controlled. Infants in incubators received daily face and buttocks care. Infants in bassinets received a complete tub bath every other day; on alternate days those infants were given sponge baths.

Strict adherence to handwashing, the use of gowns, and other measures of aseptic technique was demanded of all personnel. Upon entrance to the nursery at the beginning of each shift, every nurse performed a "three-minute handwash." This handwash was also done for re-entry to the nursery upon return from other areas of the hospital.

The nursing procedures and routines used in the premature nursery were written in detail in the Nursing Procedure and Policy Book for Newborn and Premature Nurseries, a manual of the nursing service department. The nursing staff followed these procedures, using slight variations to meet the individual infant's needs.

The two main methods used in feeding premature infants in the Center were bottle and gavage. Gavage feedings were used to a great extent. The infant's ability to suck and nurse from the bottle without tiring was the criterion used for changing over to gradual bottle feedings.

Although hypodermoclysis is used as a method of maintaining fluid balance, the administration of fluids intravenously was the method of choice at the time of the current study. One infant was

observed receiving a clysis administered by the doctor, and two infants were observed receiving intravenous fluids during the time of the current study.

The methods of resuscitation used in the nursery included the application of rocking by hand or attending the mechanical rocker for the purpose of stimulating respirations. Suctioning was done by removing mucus and fluid from the oropharynx by use of a rubber ear syringe and from the trachea by use of a rubber catheter attached to a DeLee mucus trap.

The nursing staff used a piece of paper which they called a "jot sheet." This paper was kept in the room with them at all times. Each nurse wrote down short comments obtained from the nurse who previously cared for the infant. In addition, she recorded immediately her observations and other pertinent facts about the infant with regard to temperature, pulse, feeding, activity, respirations, and color. This activity, related to the nursing skills of observation, was one of the main criteria on which the nurse based the infant's individual nursing care.

One of the functions at the Center was to conduct research studies. Many of the studies being conducted at the Center at the time of this nursing study were related to the nutritional and blood chemistry levels of premature infants. To obtain this information it was necessary to collect all urinary and fecal excretions of the infant. The infant was placed on nylon netting stretched over a pan that had an opening through which the urine could be collected. The pan fit into either an incubator or bassinet, in place of the mattress. The nursing

care related to these studies involved additional skin and buttocks care as a means of comfort for the infant and a method for the prevention of infection. In addition, the nurse had to apply some form of restraint to the infant and carefully collect all urine and stool by a special technique.

The preceding statements describe, in general, the various aspects of nursing care which were observed during the study and, consequently, had some influence on the amount of nursing care provided for these infants.

III. SUMMARY

The Colorado Premature Center was established in 1948. The main purposes of the Center were: (1) to provide medical, nursing, dietary, social service, and follow-up care for all infants admitted to the Center; (2) to conduct educational programs for nurses, doctors, and other personnel engaged in the care of premature infants; and (3) to conduct research programs related to causes and prevention of prematurity.

A Program Review of the Center, conducted in 1950, noted a large number of smaller infants being admitted to the Center which would reflect in the cost of care, duration of stay, and the type and number of professional personnel needed. The authors of the review concluded that a study of nursing time directed toward the care of premature infants was needed.

The history of the Center was followed by a discussion of the physical construction of the premature nursery and nursing procedures

and activities performed in the nursery. The methods of procedures and nursing activities described were uncontrolled variables of the study.

CHAPTER IV

METHODOLOGY

The lack of literature on the nursing care of premature infants in relation to the weight of the infant led to the selection of the problem for this study.

The problem was to determine whether the direct preparation for and the direct administration of nursing care to premature infants of different weights varied as to the number of activities performed and the amount of time utilized for these activities in relation to the weight of the infant.

The content of this chapter was designed to describe the method and techniques used in the collection and analysis of data for the study.

I. METHOD AND TECHNIQUE

The information obtained for the study described an existing situation; therefore, the normative-descriptive method was used.

The normative-descriptive method, also known as the normative-survey method, is concerned with a description of facts and conditions as they exist, without imposition of control upon factors

influencing the materials under investigation.[1] If the data is gathered especially to meet a purpose, and if the results are utilized in certain frames of thought, the preparation and reporting of data, summarization, analysis, and interpretation constitute a descriptive study.[2]

Jahoda, Deutsch, and Cook discussed descriptive studies as not being limited to any one technique; one may use a combination of techniques such as interview, questionnaire, projective techniques, direct observation, and analysis of records. Direct observation was used in the current study. The activities were observed and recorded by number of activities and time utilized for the activities.

Observation. Scientific observation is described as being specific, systematic, and quantitative. The length of observation periods, the intervals between observations, and the number of observations are carefully planned.[3] The specifics to be observed are carefully defined so that judgments do not have to be made at the time of observation.[4] The technique is subjected to preliminary trials for the purpose of determining whether or not a certain activity

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[1]Arvil S. Barr, Robert A. Davis, and Palmer O. Johnson, Educational Research and Appraisal (Philadelphia: J.B. Lippincott Company, 1953), p. 337.

[2]Carter V. Good and Douglas E. Scates, Methods of Research (New York: Appleton-Century-Crofts, Inc., 1954), p. 257.

[3]Ibid., p. 648.

[4]Good, Barr, and Scates, op. cit., pp. 404-405.

constitutes an instance of what one is going to observe. By limiting the scope of data and by careful definitions, one can eliminate much of the personal bias of the observer.[5]

By reporting how the observations were made, under what conditions, when, and where, it becomes possible in reporting the observations to let others know the limitations of the data and to protect the observer from attack.[6]

Written authorization to make observations in the premature nursery was obtained from the Director of Nursing Service, Colorado General Hospital.

Population and sampling. Underwood and others define a population and a sample as:

> A population is any group of people who are alike in at least one specified characteristic.
>
> A sample is any number of cases less than the total number of cases in the population from which it is drawn.[7]

The population of this study consisted of premature infants weighing between 750 and 2000 grams who were admitted to the Premature Center for care. Several of the infants were born in the hospital where the center is located. Other infants had been transferred from other hospitals.

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[5]Good and Scates, op. cit., p. 650.

[6]William J. Goode and Paul K. Hatt, Methods in Social Research (New York: McGraw-Hill Book Company, 1952), p. 127.

[7]Benton J. Underwood and others, Elementary Statistics (New York: Appleton-Century-Croft, Inc., 1954), p. 106.

Using the statistics available for the year 1956-1957, the population of premature infants admitted to the Center was studied. The following figures provided an estimate of the number of infants of various weights that might be available for observation.

Birth Weight in Grams	Born at Hospital	Born in Outside Hospitals
501 - 1000	14	15
1001 - 1250	7	13
1251 - 1500	7	33
1501 - 2000	29	35
Total	57	96

The tentative approach to sampling was to observe all infants available within the selected weight range. After reviewing the above statistics, it was doubtful that there would be more than twenty infants of various weights available for observation at any given time. A study of twenty infants would limit the analysis of data in obtaining relationships or comparisons. Since the time available for observations was limited, it was necessary to take another approach.

After consulting authorities in the field of research and obtaining support from the literature, a plan was devised for the selection of samples for observations. Random sampling could not be done.

> Randomization should not be used when the number of subjects is small . . . The subject is given many trials under a single condition so effectively it is as if many subjects were used and each given one trial on each condition.[8]

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[8]Benton J. Underwood, Psychological Research (New York: Appleton-Century-Crofts, Inc., 1957), p. 108.

The samples for each observation period were all infants weighing between 750 and 2000 grams who were cared for by one nurse; or they were in the same room as the observer and cared for by another nurse at a time when no other infant was being observed.

II. DEVELOPMENT OF TOOLS AND PROCEDURES

Development of the observation check list. The cardinal principles of premature care, obtained from the review of literature, were used as a basis for developing a tool to be used as an observation check list. Each principle was used as a category heading. From the nursery procedure book, the nursing activities which the cardinal principles indicated were important were selected for observation and initially listed under the appropriate category. For example, handwashing, gowning, and damp dusting the unit were placed under the category of prevention of infection. The category headings were stated as: (1) prevention of infection, (2) control of body temperature and respirations, (3) maintenance of body fluids and nutrition, (4) observations, and (5) psychological care.

A pretest of this tool indicated that the observer should group the related activities as they tended to occur while nursing care was being given. In his discussion of construction of observation schedules, Lundberg points out that items should be arranged and grouped to facilitate ease of the eye in following and locating the subject, as well as grouping items which are related.[9]

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[9]George Lundberg, Social Research -A Study in Methods of Gathering Data (second edition; New York: Longmans, Green and Company, 1942), pp. 168-170.

The nursing activities were then grouped under the main categories: (1) general care, which included body care and temperature control, (2) psychological care, (3) feeding, (4) maintaining respirations and airway, (5) observations, (6) medications, (7) intravenous fluids, and (8) miscellaneous. Grouping by this method facilitated ease of locating activities on the check list and recording time spent for these activities.

The above eight groups of related nursing activities became the permanent categories used for the observation check list and the analysis of data.

Each category of activities was arranged into sub-listings as follows: (1) preparation for the activity, (2) handwashing, (3) gowning, (4) the other individual activities related to the group such as diapering, bath, weighing, taking the temperature, feeding, giving medications, and suctioning, (5) removing the equipment, (6) removing the gown, and (7) recording on the "jot-sheet."

In describing the content of the check list, certain activities must be defined as to their relationship to direct preparation for and the administration of nursing care.

Handwashing and gowning were included as direct preparation for nursing care since no nursing care was administered to a premature infant unless preceded by the above preparation. The "three-minute handwash," required on entering the nursery and referred to in Chapter III, was not included as direct preparation for individual infant care.

The removal of equipment from the infant's bedside stand and damp dusting of the unit occurred before the nurse removed her gown and washed her hands. These activities were aspects of prevention of infection and occurred simultaneously with the rest of the nursing care. Therefore, these activities were included as part of the study.

Recording, listed under the categories of general care, feeding, maintaining respirations and airway, and observation, included the immediate recording of observations related to the activities of those specific categories. Charting on the nurses' notes, graphic sheets, and other records, such as the Kardex and admitting census sheet, were not included.

Other items contained in the category of general care were taking the temperature, diapering, buttocks care, weighing, bathing, dressing, and changing the linen. Two types of baths were listed. Face and buttocks care were listed as "sponge bath." The other type of bath was the regular bath given in a basin and listed as "tub bath." Preparation for general care included obtaining the necessary linen, thermometer, and other materials from the bedside stand.

Psychological care was defined as activities independent of another activity, such as holding, patting, rocking, or talking to the infant.

Under the category of feeding, the preparation for feeding included obtaining the bottle of formula from the bottle warmer, the gavage set when indicated, and the item used for protection from "drooling" or regurgitation of formula. The sub-listing termed "feeding"

included the process of feeding by bottle, gavage, cup, or dropper, and the "burping" of the infant.

Maintaining respirations and an airway involved the administration of oxygen by mask, regulation of the flow of oxygen in the incubators, resuscitation, and suctioning.

Observations made by the nurse on the pulse rate, respirations, appearance of the infant, activity, changes in conditions, and other vital information were recorded under the category of observation.

Under the categories of medications and intravenous fluids, the preparation for these activities was preparing the medication or fluids before going to the infant's bedside.

The last category was listed as miscellaneous care. Under this category were listed activities of turning or positioning the infant, reading oxygen concentrations, placing the infant in isolation, and transferring the infant from an incubator to bassinet.

The category--research activities-- was added to the check list after the pilot study was done. This category included changing the net on which the infant rested collecting the specimens of urine and stool, and cleansing of the infant's body to remove urine or stool.

The timing of activities. It was necessary to decide how much would be included within the timing of an activity. In activity studies that have been done in nursing, the timing of procedures and activities usually included the time required to walk to and from the

utility rooms and place of work, washing hands, and getting in and out of gowns.[10] In performing a time study of nursing, Pfefferkorn stated:

> It is important for the integrity of such a study that each procedure timed be governed by an accepted set of constant standards. This does not necessarily imply uniformity of techniques. It does presuppose:
>
> (1) A recognized good technique with emphasis on essential content.
>
> (2) Common constituent parts for the timing of each treatment:
> (a) preparation for treatment.
> (b) giving of treatment.
> (c) cleaning up after treatment.
> (d) charting of treatment.[11]

Because this study was concerned with the direct nursing care being given at the bedside of the infant, the time required to get from one room to another was not included.

It was anticipated that the performance of many activities which normally follow a sequence would be separated by interruptions such as answering the phone or going to check on another infant; therefore, repetitive timing was used. In repetitive timing, the stop-watch was stopped at the completion of each element or nursing activity, and each activity was timed separately.[12] A split-second stop watch was used

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[10]Louise Cady and Roslyn MacNish, "Nursing by the Clock," Modern Hospital, 78:66, February, 1952.

[11]Blanche Pfefferkorn and Marian Rottman, Clinical Education in Nursing (New York: MacMillan Company, 1932), p. 14.

[12]Dale Yoder, Personnel Management and Industrial Relations (New York: Prentice-Hall, Inc., 1946), p. 113.

for timing the activities. According to Mogensen, the split-second watch is superior to the decimal-minute watch for time studies.[13]

The pilot study. A pilot study was made by observing the nursing care, as defined in the check list, given to six infants during a four-hour period. The purpose of the pilot study was to determine: (1) the completeness of activities listed on the check list, (2) whether or not the activities were clearly defined, (3) the ease and accuracy of recording a time element, and (4) the possible effects of the observer on the observee.

During the pilot study an additional group of activities was added to the observation check list. The medical staff instituted a new series of research studies which involved the twenty-four hour collection of urine and stools from selected infants.

After some revision and the inclusion of the activities related to the research project under a separate category, the observation check list appeared to be adequate. The final edited check list contained nine categories of nursing activities--the eight categories as revised after the pretest and the added category of research activities. Plans were made to continue the study without further revision.

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[13]Allan H. Mogensen, Common Sense Applied to Motion and Time Study (New York: McGraw-Hill Book Company, 1932), p. 48.

III. COLLECTION OF DATA

To reduce the influence of the observer on the nurses being observed, a written notice stating the general purpose of the study was submitted to the nursing staff. The investigator met with the group and assured them that it was not a time study involving individual nurse's skills. Jahoda, Deutsch, and Cook wrote:

> Apparently people get used to observers as long as the behavior of the observer convinces the group members that they are no threat.[14]

Observation schedule. In order to obtain the largest number of observations in a short period of time, the following observation schedule was adopted. Observations were to be made at 3 four-hour periods during the twenty-four hour day. An example of the observation schedule follows.

8 A.M.-12 Noon 4 P.M.-8 P.M. 12 Midnight-4 A.M.

After the third four-hour observation period, an eight-hour interval occurred before the observations resumed.

There were interruptions in the observation schedule as originally planned. The observer was ill and missed two days at the beginning of the study. At three different times, the observer made two consecutive four-hour observations. Eight-hour observation periods

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[14]Marie Jahoda, Morton Deutsch, and Stuart W. Cook, Research Methods in Social Relations (New York: Dryden Press, 1951), p. 534.

are not recommended as the observer tends to lose his accuracy and acuity during the longer period of time.

Observations were scheduled for a two-week period or until a consistent pattern of information was obtained.[15] Toward the last of the two-week period a consistent pattern had not been obtained. One-hundred and nineteen observations were made between June 5 and June 16. An additional nineteen observations were made between June 23 and June 25, as time was available for the observer.

Observation and recording of data. At the beginning of each observation period, the check list was prepared by recording the time and date of observation, and the weight of the infant being observed. Additional notes were written on the check list, at the time of observation, regarding the condition of the infant, for example, the amount of mucus which seemed to interfere with the feeding. The name, age, and condition of the infant, the nurse who cared for the infant, and the number of babies assigned to the nurse were also listed on the check list. Because of their relationship to the nursing care requirements for premature infants, the above factors were used by the writer to make interpretations and recommendations for further studies.

Each activity listed on the check list was observed and a time recorded in seconds for that activity. If a nurse finished caring for one infant, washed her hands, and moved on to care for another infant, the time spent for handwashing was recorded on the observation of the

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[15]Pauline V. Young, Scientific Social Surveys and Research (third edition; Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1956), p. 304.

second infant. If the nurse had washed her hands and then became engaged in an activity not included in the study, for example, charting on nurses' notes, the time spent for handwashing was not recorded.

During a feeding, if the infant appeared to have been "burped" sufficiently, as judged by the observer and as inferred from the verbal or overt expression of the nurse's behavior, and the nurse continued to sit, rock, pat, or talk to the infant, the stop watch was stopped and restarted with the recognition of this new activity. The time spent in this latter activity was recorded under psychological care. This is one area which required judgment and interpretation on the part of the observer. A total of 138 observations was made. Although several observations were made on each infant, each observation was identified by the specific weight of the infant at the time of observation.

IV. METHOD OF ANALYSIS

Analysis is an important step in problem solving. Good, Barr, and Scates described analysis as a process of resolving the gross total situation into elements each part of which the investigator may give his separate and individual attention.[16]

The analysis of the data collected has been presented in both textual and tabular presentation. Textual presentation is a recording of results in the form of explanatory description or narration and is

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[16]Good, Barr, and Scates, op. cit., p. 12.

qualitative in form.[17] Tabular presentation of data is a means of depicting quantitative data in the form of tables and graphs.[18]

The nursing activities and their specific time recordings for each of the nine categories were listed under five weight groupings for ease of handling the data in the approach to analysis. The data collected from the observations did not provide sufficient data for a valid statistical study.

V. SUMMARY

This chapter was designed to describe the method and techniques used in the collection and analysis of data. The normative-descriptive method of study was used. The data was collected by direct observation technique.

The samples for study were selected from the population of premature infants weighing between 750 and 2000 grams who received care in the University of Colorado Premature Center.

The cardinal principles of premature care, obtained from the review of literature, formed the basis for the development of categories under which the nursing activities and recording of time were listed.

The activities were timed by the repetitive timing technique. Each nursing activity was timed separately. Only those activities

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[17]Barr, Davis, and Johnson, op. cit., p. 341.

[18]Ibid.

concerned with the direct preparation for and the direct administration of nursing care at the bedside of the infant were included in the study.

A pilot study revealed the need for minimal revision of the check list and the addition of the ninth category on research activities. The data for the larger study was collected from June 5, 1959 to June 25, 1959, and a total of 138 observations was obtained.

The data collected were tabulated under five different weight groupings for the purpose of analysis. Presentation of the analysis of data in the following chapter will be made in both textual and tabular form.

CHAPTER V

ANALYSIS AND INTERPRETATION OF DATA

The purpose of this chapter is to present the analysis and interpretation of the data collected from 138 observations of direct nursing care given to premature infants of varying weights. The analysis and interpretation of data are presented in tables, graphic presentation, and textual discussion. The quantitative analysis of the data is shown in the percentage of time devoted to the nine categories of direct nursing care in relation to the total time and according to weight groups. The data are further analyzed by showing the arithmetic mean times for the nine categories of direct nursing care in relation to the number of observations and weights of infants. The data for the total time given to direct nursing care and for nursing activities performed while giving direct care to infants in the five weight groups are analyzed by showing the arithmetic means for each weight group.

Weight Ranges for the Five Groups Used in the Analysis of Data

The data obtained in the observations of direct nursing care given to premature infants of varying weights are listed under five separate weight groups. The weight ranges for those groups are:

Group	I	751 to 1000 grams
Group	II	1001 to 1250 grams
Group	III	1251 to 1500 grams
Group	IV	1501 to 1750 grams
Group	V	1751 to 2000 grams

For the conversion of grams into pound and ounce measurements see Appendix B. In the remainder of this chapter, the weight groups will be referred to in the context as Groups I, II, III, IV, and V.

The Number of Observations Obtained in the Five Weight Groups

The observations of infants receiving direct nursing care were obtained in twenty-four separate four-hour periods of time. A composite of all direct nursing care observed on one infant during one four-hour period was considered as one observation. A total of 138 observations of activities and time utilized in giving direct nursing care to premature infants were recorded during the study. The frequencies of these observations have been grouped according to the weight in grams of each infant and are listed in Table I.

Three observations were made of infants in Group I, forty-seven in Group II, eleven in Group III, thirty-nine in Group IV, and thirty-eight in Group V. The distribution of observations made on infants, within the established weight range of the study and observed receiving direct nursing care, was not equal among the five weight groups. Therefore, statistical comparisons of the findings for the five weight groups could not be made.

TABLE I

NUMBER OF OBSERVATIONS OBTAINED IN THE FIVE WEIGHT GROUPS

Group	I	II	III	IV	V
Weight range	751-1000 grams	1001-1250 grams	1251-1500 grams	1501-1750 grams	1751-2000 grams
No. of observations	3	47	11	39	38

Uncontrolled Variables Which Affected the Analysis of Data

Age and condition of infants. The age and condition of the infants were uncontrolled variables that were not evaluated in the study. However, in the interpretation of data, those variables were considered by the investigator to be related to some of the data collected. For the purpose of clarification, the age and condition of the infants observed and how these two variables appeared to be related to the findings in certain categories of nursing care will be discussed.

Infants from birth to fifty-two days of age were observed. In general, all infants under twelve days of age were considered by the physician in fair condition, except for the majority of prematures less than forty-eight hours of age whose condition was considered by the physician as poor at the time of observation. The infants in the smallest weight group were also considered in poor condition. Groups I and III were the only groups homogeneous in both age and condition. A range of ages and a variety of conditions characterized the infants observed in the other three groups.

The age of the infant appeared to influence the frequency and length of time spent in the activities of bathing, dressing, and weighing the infant. The frequencies and length of time recorded for these activities in observations of older infants was greater than those recorded for the younger infants. This factor is a reflection of the philosophy of minimizing the handling of the young infant and giving the older infant more psychological care through body and verbal contact, when his condition so permits.

The age of the infant was a factor in the selection of infants for the research studies being conducted at the time of the current nursing study and mentioned in Chapter III. All observations of nursing care related to the research studies were of infants over twenty-five days of age, with the exception of one observation on a premature infant in the largest weight group who was twenty-four hours old. Due to the criterion of age for the selection of infants for research studies, the nursing care in the category of research activities was influenced in terms of the infants in each weight group who received the care related to the research studies.

The condition of the infant appeared to be reflected in the frequent recording of the activities of: (1) gowning, handwashing, changing of diapers and giving buttocks care when the infant was having many stools; (2) taking temperatures on infants, young in age or in poor condition, who were unable to maintain a relatively stable temperature; and (3) frequent cleansing of the infant and changing of clothing soiled by regurgitation or emesis.

The condition of the infant appeared to be related to the infants who received psychological care and the amount of time spent by the nurse in performing the related nursing activities. Except for one observation of a sick infant in a larger weight group, the infants who received more than 30 seconds of psychological care were reported to be in good condition.

The age of the infant appeared to have some relationship to the psychological care given to infants in the smaller weight groups. In Groups II, III, and IV, the infants who received psychological care were ten days of age or older. Age was not a related factor to the psychological care observed given to infants in Group V.

The age and condition of the infant were reflected in the amount of formula given, the frequency of feedings, the method of feeding, and the length of time spent in feeding. The younger infants and infants reported in poor or fair condition received smaller amounts of formula at one feeding, were fed at more frequent intervals and were usually fed by gavage.

In general, the time spent in one gavage feeding was less than the time spent feeding an infant by bottle. If the feeding proceeded without difficulties, the infants were fed in a relatively short time. Examples of difficulties incurred were an excessive amount of mucus, requiring the aspiration of mucus by suction and/or lavage, and an infant who tired easily with feedings and needed frequent periods of rest. If the amount of formula given at one feeding was increased while the infant was still on all or part gavage feedings, the amount of time spent for one gavage feeding increased.

The condition of the infant appeared to be related to whether or not the nursing activities in the category of medications were observed. The observations obtained in the category of medications were of infants who were considered by the physician to be sick.

Also, the condition of the infant seemed to be related to the nursing activities observed in the category of maintaining respirations and an airway. The observations obtained for this category were of premature infants under forty-eight hours of age and other infants reported in poor condition and having difficulties with excessive mucus.

Variations in the Ability, Skill, and Experience of the Nurses Giving Nursing Care

There were other uncontrolled variables which affected the analysis of data. Variations in the ability, skill, and experience of the nurses giving the nursing care were anticipated by the investigator and noted during the study. Variations were noted in the recording of time for activities performed where the weight, age, or condition of the infant did not seem to influence the length of time spent. A few of the nurses were consistently slower than others in administering care, while others worked consistently faster.

Some examples of the variations noted follow. The times recorded for taking axillary temperatures ranged from 40 to 180 seconds. The times recorded for changing of a damp diaper, not including buttocks care, ranged from 30 to 75 seconds. There were also variations for the times recorded for a complete change of linen in

an incubator, ranging from 50 to 180 seconds. One other factor which appeared to influence the speed of performance of the individual nurse was the amount of time available in which to care for the infant. When the work assignment was greater, as frequently occurred on the evening and night shifts, many of the nurses' speeds of performance seemed to increase. When time allowed, a greater length of time was spent by some nurses in performing the activities.

Distribution of Time Utilized in Nine Categories of Direct Nursing Care in Relation to All Infants Observed

A total of 137,982 seconds was recorded for the 138 observations of direct nursing care to premature infants of varying weights. The distribution of time utilized for the nine categories in 138 observations is expressed in percentages of total time in Figure 1. Data from which Figure 1 was drawn are included in Appendix C.

Of the total time recorded for direct nursing care, 31.9 per cent of the total nursing time was given to the category of general care.

Seven observations included the nursing activities performed by the nurse in caring for the infants placed on research studies and utilized 1.7 per cent of the total time. The number of observations obtained for the category of research activities was small, and the observations were of infants in the three larger weight groups.

Twenty-one observations included psychological care, given to infants in four of the weight groups. The time spent in nursing

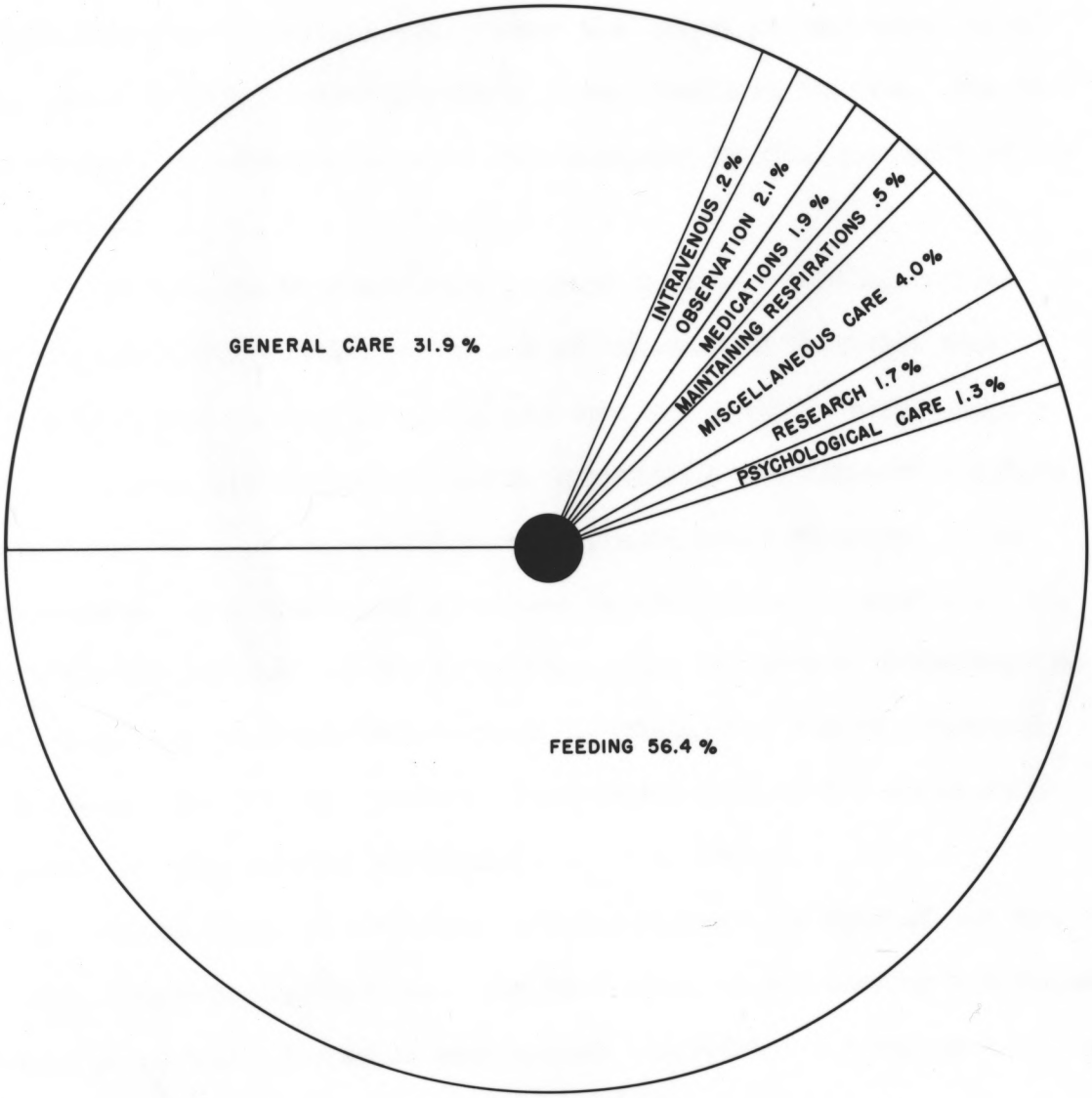

FIGURE I

PERCENTAGE OF TOTAL TIME UTILIZED IN DIRECT NURSING CARE DURING 138 OBSERVATIONS

activities related to this category utilized 1.3 per cent of the total time given to direct nursing care.

Figure I, page 44, shows that the category of feeding and its related nursing activities constituted the larger percentage of total time given to direct nursing care of these premature infants. The time utilized for the nursing care in this category was 56.4 per cent of the total time.

Eighteen observations were made of infants receiving nursing care in maintaining respirations and an airway. Of the total time given to direct nursing care, 0.5 per cent was spent in this category.

Nursing activities related to appraisal observation of infants, independent of other nursing activities, were noted in every observation. The time spent by nurses in making the observations utilized 2.1 per cent of the total time. The majority of observational activities was frequent but of short duration. The stated percentage did not account for the numerous observations made by the nurse while engaged in other nursing activities.

Twenty-three observations included infants, in four of the weight groups, receiving medications. The time spent in the nursing activities listed under the category of medications constituted 1.9 per cent of the total time.

Administration of intravenous fluids was observed twice on infants in the smallest weight group. The time given to the nursing activities in the category accounted for 0.2 per cent of the total time given to direct nursing care.

Nursing activities related to the category of miscellaneous care were recorded in every observation. Although three observations were of infants who slept through most of the observation period, the infants were turned and positioned upon awakening. Miscellaneous care activities utilized 4 per cent of the total time.

The percentage distributions of total time utilized in the nine categories of care showed a wide range. The time spent for nursing care in the category of feeding constituted over 50 per cent of the direct nursing care time given to all infants. The findings from this study would indicate that the feeding of prematures is a major factor which influences the amount of time needed for direct nursing care.

Another finding indicated that the nursing activities in the category of general care utilized the second largest amount of direct nursing care time. This finding would seem to indicate that the amount of time spent in general care activities is also a good indicator of the amount of time needed for direct nursing care of premature infants.

A further finding showed that nursing activities in the categories of observation and miscellaneous care were performed while giving direct nursing care to all infants. However, the percentage of total time spent in these two categories of care was relatively small in comparison to the categories of feeding and general care.

Other findings showed that the time spent for the nursing activities in the categories of research, psychological care, maintaining respirations and airway, medications, and intravenous fluids constituted small percentages of the direct nursing care time. The nursing activities for those categories were not observed being

performed in the nursing care of all infants. This finding would suggest that the nursing times spent in above categories, in relation to weight, are not comprehensive indicators of the amount of time needed for direct nursing care and are related to other factors such as age and condition of infants.

Distribution of Time Utilized in the Nine Categories of Direct Nursing Care in Relation to Weight Groups

The distribution of time, expressed in percentages of total time, utilized in the nine categories of direct nursing care given to infants in the five weight groups appears in Figure 2. Data from which Figure 2 was drawn are included in Appendix C.

Group I. Of the 3,103 seconds recorded for 3 observations of direct nursing care given to infants within this weight group, 34.4 per cent of the time was spent in the category of general care. There were no nursing activities observed in the categories of research, psychological care, or medications. The time given to the category of feeding constituted 51.7 per cent of the total time. The category of maintaining respirations and an airway utilized 1.6 per cent of the total time and the category of observations accounted for 2.3 per cent of the total time. Nursing activities listed in the category of the administration of intravenous fluids utilized 7.7 per cent of the time given to direct care. Of the total time recorded, 2.3 per cent was utilized in the category of miscellaneous care.

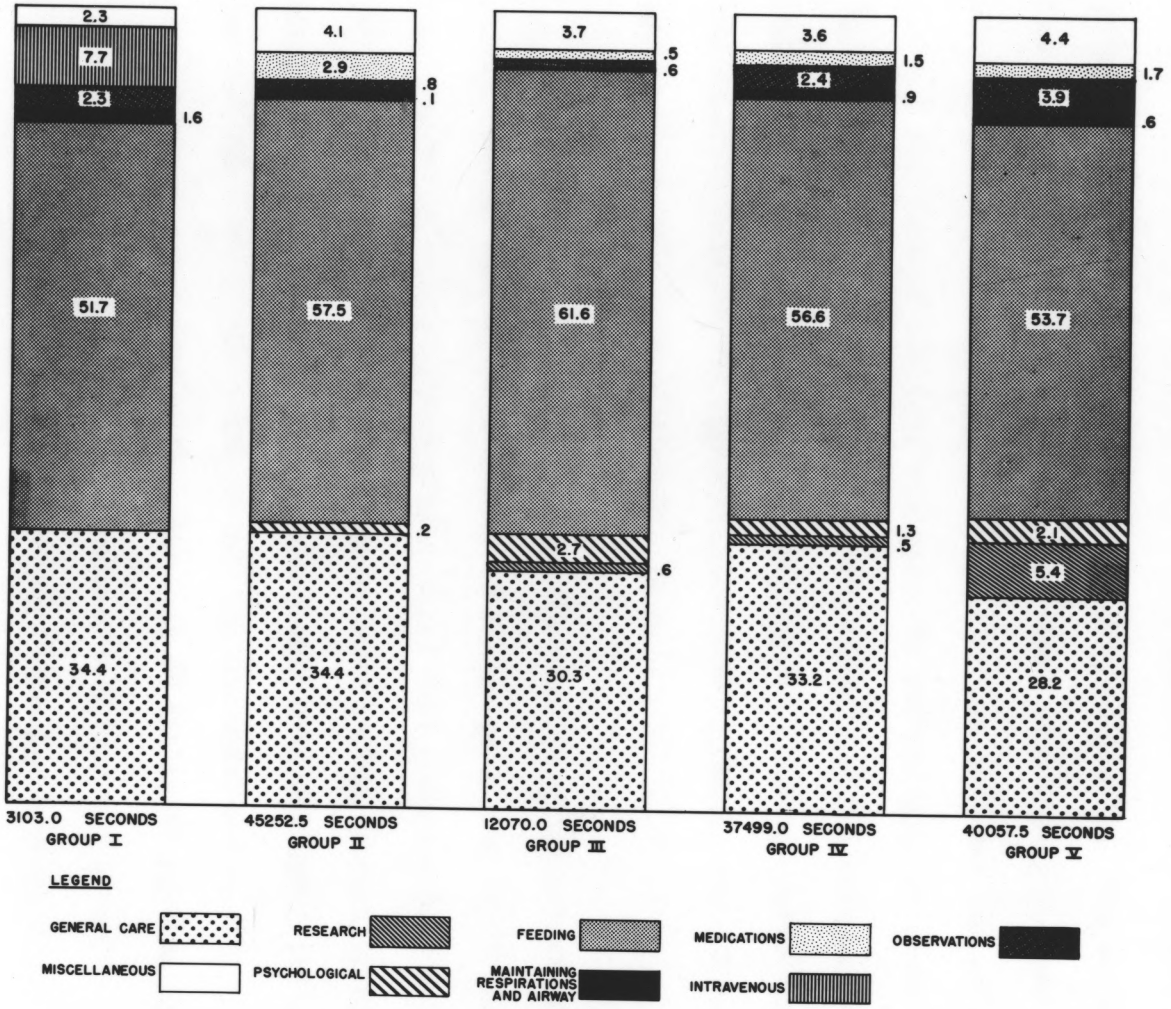

FIGURE 2

PERCENTAGE OF TOTAL TIME UTILIZED IN NINE CATEGORIES OF DIRECT NURSING CARE IN EACH PREMATURE INFANT WEIGHT GROUP

Group II. A total of 45,252.5 seconds was recorded for 47 observations of direct nursing care given to infants in this group. Of the total time, 34.4 per cent was spent in the category of general care. There were no nursing activities observed in the categories of research or the administration of intravenous fluids. The category of feeding utilized 57.7 per cent of the total time. Only 0.1 per cent of the total time was utilized in maintaining respirations and an airway and 0.8 per cent of the time was spent in the category of observations. The percentage of total nursing time utilized for the category of medications was greatest in this weight group, 2.9 per cent. The time spent in the category of miscellaneous care accounted for 4.1 per cent of the time given to direct nursing care.

Group III. The total time recorded for 11 observations of direct nursing care given to infants in this group was 12,070 seconds. The time spent in the category of general care composed 30.3 per cent of the total time. The number of observations including nursing care listed under the category of research activities was small and accounted for 0.6 per cent of the total time. The one observation of psychological care utilized 2.7 per cent of the total nursing time. As in other groups, the category of feeding utilized the largest percentage of total time given to direct nursing care--61.6 per cent. The nursing care recorded for the category of observation accounted for 0.6 per cent of the total time. The category of medications utilized 0.5 per cent of the total time and miscellaneous care constituted 3.6 per cent of the total time given to direct nursing care.

Group IV. Of the 37,499 seconds recorded for 39 observations of direct nursing care to infants in this weight group, 33.2 per cent of that time was spent in the category of general care. The category of research activities utilized 0.5 per cent of the total time and 1.3 per cent was given to the category of psychological care. The category of feeding utilized 56.6 per cent of the total time spent in direct nursing care, the largest percentage of total time as noted in other groups. The category of maintaining respirations and an airway utilized 0.9 per cent of the total time and the time utilized in making appraisal observations of infants was 2.4 per cent. The time spent in the category of medications accounted for 1.5 per cent of the total time and 3.6 per cent was utilized in the category of miscellaneous care.

Group V. A total of 40,057.5 seconds was recorded for 38 observations of direct nursing care to infants in Group V. Of this total, 28.2 per cent of the time was spent in the category of general care. The category of research activities utilized 5.4 per cent of the total time, the highest percentage of total time utilized in this category among the five weight groups. The time spent in the category of psychological care utilized 2.1 per cent of the total time. A smaller percentage of total time was spent in the category of feeding than in other weight groups--53.7 per cent. The time utilized in the category of maintaining respirations and an airway comprised 0.6 per cent of the total time and 3.9 per cent was spent in the category of observations. Giving medications to sick infants utilized 1.7 per cent

of the time given to direct nursing care of infants in the group. The percentage of total time given to the category of miscellaneous care was greater than in the other groups--4.4 per cent.

The percentage distributions of total time utilized in each of the nine categories of direct nursing care varied among weight groups.

The findings indicated that the percentage of total time spent in the category of general care showed a trend toward a decrease as the weights of the infants increased. This finding would suggest that the weight of infants might be one index for estimating the amount of nursing care needed in the category of general care.

It was found, also, that over 50 per cent of the total time was utilized by all groups in nursing activities listed under the category of feeding. This finding would seem to suggest that the feeding needs of premature infants be assessed more clearly when determining the time needed for direct nursing care. In general, infants in the smaller weight groups and young infants in the middle weight groups received smaller amounts of formula by the gavage method but were fed at more frequent intervals, increasing the amount of time spent in feeding. In addition, older infants in the smaller weight groups and sick infants in all weight groups were fed by the gavage method at more frequent intervals. Many of those infants had increased feeding times either because they resisted the gavage feeding or experienced feeding difficulties.

The findings within the categories of research activities and psychological care showed that a greater percentage of the total time was spent in these two categories of care for infants in

Groups IV and V. This finding would seem to indicate that the total time spent in direct nursing care of premature infants in a nursery would increase somewhat when there were a larger number of infants in the weight range of Groups IV and V.

Other findings in the categories of maintaining respirations and an airway, medications, and intravenous fluids showed that the percentage of total time utilized for the nursing activities in those categories of care varied greatly among the groups, with no apparent relationship to the weights of infants. Many of the observations did not include the above care. The findings would suggest that the amount of nursing time spent in the categories of maintaining respirations and an airway, medications, and intravenous fluids were not related to the weights of infants in this study but may have been more closely related to the age and condition of the infants.

Mean Times Utilized in Nine Categories of Direct Nursing Care for Each Weight Group

In the following discussion each category of nursing care is presented in the order of appearance on the observation check list. The arithmetic means, in seconds, are presented in relation to the number of observations and weights of infants for each of the nine categories of care.

Category of General Care. Some observations of infants receiving care listed under the category of general care included the nursing activities of morning care. In addition to taking the temperature, changing the diaper, and giving buttocks care, morning

care included the bath--sponge or tub--changing the linen and weighing the infant. When included in the observation, morning care accounted for more than half the time spent in the category of general care. The observations which included morning care were not equally distributed among the weight groups. One of the observations in Group I included morning care, six in Group II, one in Group III, seven in Group IV, and eight in Group V.

The mean times, in seconds, in relation to the number of observations and the weights of infants for the category of general care are listed in Table II.

Every observation of direct nursing care included the nursing activities listed under the category of general care. In Group I, a mean time of 356 seconds was devoted to giving general care to infants in three observations. For the 47 observations of general care in Group II, the mean time was 331.6 seconds. In Group III, the eleven observations of infants receiving general care had a mean time of 332.2 seconds. In Group IV, the mean time for 39 observations of infants receiving general care was 318.8 seconds. In Group V, there were 38 observations of general care and the mean time was 297.5 seconds.

Many of the nursing activities listed under the category of general care were performed at feeding time. Before each feeding the nurse would take the temperature of the infant, change the diaper as indicated, and give buttocks care when needed.

In Group I, the number of nursing activities recorded was not large. The time spent in the one observation of general care, which

included morning care, was 634 seconds compared to the 170 and 260 seconds recorded for the two other observations of general care. In view of the large range in seconds and the small number of observations, the mean for this group would be questionable as to validity.

TABLE II

MEAN TIMES, IN SECONDS, IN RELATION TO THE NUMBER OF OBSERVATIONS AND WEIGHTS OF INFANTS FOR THE CATEGORY OF GENERAL CARE

Group	I	II	III	IV	V
Weight in grams	751-1000	1001-1250	1251-1500	1501-1750	1751-2000
No. of observations	3	47	11	39	38
Mean Time in seconds	356.0	331.6	332.2	318.8	297.5

In Group II, several observations were of younger infants and 50 per cent of the observations included two feedings of an infant during one observation. Temperature readings, changing of diapers, and buttocks care were frequently recorded, along with an increased length of time spent in these activities and the changing of linen.

In Group III, several observations were of infants under twelve days of age and 50 per cent of the observations included two feedings of an infant during one observation. The changing of diapers, giving buttocks care, and taking temperatures were frequently recorded. The average number of general care activities performed in Group III was less than in Group II, where several of the observations included

morning care. However, the mean time for the category of general care in Group III was approximately the same as the mean for Group II, although the infants in Group III were larger in weight.

Approximately 30 per cent of the observations of direct nursing care in Group IV were of infants fed at three-hour intervals. There was a trend toward an increased frequency in general care nursing activities of taking temperatures, changing diapers, and giving buttocks care, as these activities were usually done at the time of feeding. Since in Group IV more than one feeding of the infants, fed at three-hour intervals, was seldom observed during a period of observation, the general care activities performed at feeding time were not observed as frequently as in Groups II and III.

In the fifth weight group, numerous handwashings, changing of diapers, and giving buttocks care were recorded. However, since a greater number of observations were of infants fed at four-hour intervals, the general care activities performed at feeding time decreased and resulted in a decreased mean time for the category of general care for Group V.

Although the data seemed to indicate a decrease in time for general care as weights increased, a closer examination of related factors would suggest the findings were more closely related to feeding. When the majority of observations was of infants fed at three-hour intervals, a greater length of time and a greater frequency of nursing activities were recorded under the category of general care. When the majority of observations was of infants fed at four-hour intervals, the nursing activities listed under the category of general care,

performed at feeding time, occurred less frequently and the amount of time expended for these activities decreased accordingly.

Category of Research Activities. The nursing activities listed under the category of research were not observed in every observation of direct nursing care. Seven of the observations included nursing care related to the category of research. The mean times, in seconds, in relation to the number of observations and weights of infants for the category of research activities are listed in Table III.

The nursing activities listed under the category of research activities were not noted in observations of infants in Groups I and II. Of the eleven observations made in Group III, one included 70 seconds of nursing care related to research activities. Of the 39 observations in Group IV, one included 202 seconds of care in this category. In Group V, five of the thirty-eight observations included nursing care listed under this category and had a mean of 433.6 seconds.

TABLE III

MEAN TIMES, IN SECONDS, IN RELATION TO THE NUMBER OF OBSERVATIONS AND WEIGHTS OF INFANTS FOR THE CATEGORY OF RESEARCH ACTIVITIES

Group	I	II	III	IV	V
Weight in grams	751-1000	1001-1250	1251-1500	1501-1750	1751-2000
No. of obs.	0	0	1	1	5
Mean Time in seconds	- - -	- - -	70.0	202.0	433.6

Considering only the weight variable, the findings within this category revealed an increase of mean times for nursing care in the category of research activities as the weights of infants increased.

The findings would further indicate that as the weights of infants in a group increased, there occurred an increase in the number of older infants, who were selected for research studies.

Category of Psychological Care. Twenty-one of the observations included nursing activities in the category of psychological care. The mean times, in seconds, in relation to the number of observations and weights of infants for the category of psychological care are presented in Table IV.

There was no psychological care observed being given to infants in Group I. In Group II, a mean time of 20 seconds was devoted to giving psychological care in 3 of the 47 observations. Of the 11 observations in Group III, one included 330 seconds of psychological care given to an infant. In Group IV, seven of the thirty-nine observations included psychological care and had a mean of 67.1 seconds. Of the 38 observations in Group V, ten included the category of psychological care and had a mean of 85.6 seconds.

Considering only the weight variable, the findings within the category reveal that a greater number of infants in the two larger weight groups received psychological care and more time was spent

in giving this care than in the smaller weight groups. This finding would reflect the philosophy of minimal handling of smaller infants.

TABLE IV

MEAN TIMES, IN SECONDS, IN RELATION TO THE NUMBER OF OBSERVATIONS AND WEIGHTS OF INFANTS FOR THE CATEGORY OF PSYCHOLOGICAL CARE

Group	I	II	III	IV	V
Weight in grams	751-1000	1001-1250	1251-1500	1501-1750	1751-2000
No. of observations	0	3	1	7	10
Mean Time in seconds	- - -	20.0	330.0	67.1	85.6

Category of Feeding. The variation of mean times for the category of feeding were influenced by several factors. The smaller infants were most frequently fed at three-hour intervals and by gavage. During many of the observations, one infant was observed receiving two feedings. Younger infants received smaller amounts of formula at one feeding. Infants who were sick and considered by the physician to be in only poor or fair condition often encountered feeding difficulties.

Of the 138 observations made during the study, 132 included the nursing care listed under the category of feeding. The mean times, in seconds, in relation to the number of observations and weights of infants for the category of feeding are listed in Table V.

The mean times for the category of feeding did not increase or decrease in direct relation to weight increase of infants. Although there was a trend toward an increase in mean times as the weights

increased in the first three groups, 534.3, 554.0, and 676.7 seconds respectively, the mean for the fourth group decreased to 574.1 seconds and increased to 615 seconds for the fifth group.

TABLE V

MEAN TIMES, IN SECONDS, IN RELATION TO THE NUMBER OF OBSERVATIONS AND WEIGHTS OF INFANTS FOR THE CATEGORY OF FEEDING

Group	I	II	III	IV	V
Weight in grams	751-1000	1001-1250	1251-1500	1501-1750	1751-2000
No. of observations	3	47	11	37	34
Mean Time in seconds	534.3	554.0	676.7	574.1	615.0

For further clarification, the group means reported for the category of feeding are discussed in relation to: (1) the method of feeding observed, (2) the frequency of feeding, (3) the amount of formula given to the infant at one feeding, and (4) the difficulties encountered during the feedings.

In Group I, the mean time for 3 observations was 534.3 seconds. The infants in this group were fed at four-hour intervals by gavage and the amount of formula given at one feeding ranged from five to seven milliliters.

In Group II, the 47 observations had a mean time of 554 seconds. All of the infants observed were fed by gavage at three-hour intervals. The amount of formula given at one feeding ranged from thirteen to

twenty milliliters. In twenty-three of the forty-seven observations, the infant received two gavage feedings during an observation. Many of the feedings administered to sick infants were fairly long. Notes from the nurses' charting and the observer's records concerning these feedings stated: (1) "excessive amount of mucus," (2) "infant tiring with feeding," or (3) "infant resisting gavage." The average time spent in feeding a sick infant ranged from 400 to 460 seconds while the majority of other gavage feedings in this group ranged from 280 to 380 seconds per feeding.

The mean time for 11 observations in Group III was 676.7 seconds. The amount of formula given at one feeding ranged from ten to seventeen milliliters. In all of the observations the infants were fed at three-hour intervals. In five of the eleven observations, the infant was fed twice during an observation. In eight observations, the infants were older and required from 378 to 778 seconds for one gavage feeding. Those infants were not considered ready for transfer to nipple feedings and received gavage feedings to insure a caloric and fluid intake necessary for the minimum requirements basic to the maintenance of life. From the nurses' charting and the observer's records, the following remarks were frequently noted concerning older infants in the group: (1) "infant resisting gavage," (2)"infant sucking on tube," or (3) "infant tiring toward the end of feeding."

In two of the thirty-nine observations of direct nursing care in Group IV, the infant received nothing by mouth. The mean for 37 observations of feeding was 574.1 seconds. In twenty-two of the

thirty-seven observations the infant was fed by gavage and in fifteen observations the infant was bottle fed. The amount of formula given at one feeding ranged from twenty to forty milliliters. In one observation the infant was fed twice during the observation.

In Group IV, thirty-four of the thirty-eight observations of direct nursing care included feeding. In two observations the infant was on "demand feeding" and was not fed during the observation. In two other observations, the infant received "nothing by mouth." The mean time for thirty-four observations of feeding was 615 seconds. One observation included two feedings for the infant.

In Group V, there was a wide variation in the amount of formula given at one feeding and the frequency of feedings. The feedings ranged from fifteen to twenty-five milliliters of formula by gavage every three hours to twenty to sixty milliliters of formula by bottle every four hours or sixty to ninety milliliters of formula "on demand." In twenty-six observations the infant was fed by bottle, and in eight observations, the infant was fed by gavage. In one observation of a gavage feeding, the infant required 1040 seconds of nursing time, 360 seconds of the time spent in lavaging the infant to remove the excess mucus before the gavage feeding could proceed. Even with the lavage, the feeding was difficult and long.

Considering only the variable of weight, the findings within the category revealed some relationship of weight to the category of feeding. The findings showed that the frequency and methods of feeding in the three smaller weight groups were similar and that the mean times

for the category of feeding in these groups increased as the weights of infants increased. Although the smaller amount of formula given at one feeding and the method of feeding by gavage decreased the length of one feeding time, an increased mean was noted for the category of feeding when the feedings were at more frequent intervals and the amount of formula given at one gavage feeding increased. This factor was noted in Groups II and III where the mean times increased from 534.3 seconds for Group I to 554 seconds for Group II and 676.7 seconds for Group III. In Groups IV and V, the findings revealed that the mean times for the category of feeding did not continue to increase or decrease as the weights of infants increase.

The findings in this study would suggest there was a variation of feeding methods, frequencies, and amounts of formula given to infants in Groups IV and V. It would seem that one cannot anticipate a similarity of ages or conditions among infants over 1500 grams as these weight groups may contain older infants who have progressed from smaller birth weights or young premature infants who have an early feeding pattern of smaller amounts of formula at one feeding and sometimes more frequent intervals of feeding.

The findings further revealed that infants in Groups I and II received smaller amounts of formula, were fed by gavage, and required less time in the category of feeding than infants in Groups III, IV, and V.

Another finding was that sick infants, regardless of weight, took longer to feed, as noted in Groups II and V.

Category of Maintaining Respirations and an Airway. Eight observations included nursing activities as listed under the category of maintaining respirations and an airway. No resuscitation of infants was observed. The mean times, in seconds, in relation to the number of observations and weights of infants for the category of maintaining respirations and an airway are presented in Table VI.

In Group I, there was one observation where 50 seconds of care was given to an infant. In Group II, 30 seconds of care was given to an infant in one observation. None of the 11 observations in Group III included nursing care as listed under this category. In Group IV, infants in four of the thirty-nine observations received care in maintaining respirations and an airway, with a mean time of 86.2 seconds. Of the 38 observations of infants in Group V receiving direct nursing care, two included nursing care related to maintaining respirations and an airway and the mean time was 116 seconds.

TABLE VI

MEAN TIMES, IN SECONDS, IN RELATION TO THE NUMBER OF OBSERVATIONS AND WEIGHTS OF INFANTS FOR THE CATEGORY OF MAINTAINING RESPIRATIONS AND AIRWAY

Group	I	II	III	IV	V
Weight in grams	751-1000	1001-1250	1251-1500	1501-1750	1751-2000
No. of observations	1	1	0	4	2
Mean Time in seconds	50.0	30.0	- - -	86.2	116.0

The number of observations obtained for nursing care in this category was small. From the findings reported, there was no indication that the nursing care given to maintaining respirations and an airway was related to the weight of the infant.

Category of Observation. In every observation of direct nursing care, infants were appraised at times other than when the nurse was administering care in the other categories listed. The mean times, in seconds, in relation to the number of observations and weights of infants for the category of observation are listed in Table VII.

In Group I, the mean time of 23 seconds was for 3 observations of infants receiving the care listed under the category. Of the 47 observations in Group II, the nursing care listed under the category of observation had a mean time of 8 seconds. The mean time for the 11 observations in Group III was 6.5 seconds. In Group IV, the 39 observations of infants receiving care listed under this category had a mean time of 22.8 seconds. Group V received the highest mean for the category of observation. A mean time of 40.8 seconds was devoted to appraisal observation of infants in 38 observations of direct care.

When the nurse observed the infants in Groups II and III, many of her observations were made while she was engaged in other nursing activities. Those observations which she did make independently of other activities took less time. The time given to nursing observations of infants increased with the incidence of prematures

under 48 hours of age and infants in poor condition, as noted in Groups IV and V. In one of the observations in Group IV, a new premature infant received 660 seconds of care.

TABLE VII

MEAN TIMES, IN SECONDS, IN RELATION TO THE NUMBER OF OBSERVATIONS AND WEIGHTS OF INFANTS FOR THE CATEGORY OF OBSERVATIONS

Group	I	II	III	IV	V
Weight in grams	751-1000	1001-1250	1251-1500	1501-1750	1751-2000
No. of observations	3	47	11	39	38
Mean Time in seconds	23.0	8.0	6.5	22.8	40.8

Considering only the weight variable, the findings within the category revealed that infants in Groups I, IV, and V received more observational care by the nurse than did the infants in Groups II and III. It would seem from the data revealed that the time needed for observational care is not related primarily to the weight of the infant.

Category of Medications. In twenty-three observations, infants received medications and nursing care related to the category. The mean times, in seconds, in relation to the number of observations and weights of infants for the category of medications are listed in Table VIII.

None of the observations in Group I included the administration of medications to infants, although some of the infants were receiving

medications. In Group II, nine of the forty-seven observations had a mean time of 147.4 seconds for medications. Of the 11 observations in Group III, two included medications and had a mean of 30 seconds. In Group IV, infants in 5 of the 39 observations received a mean time of 111.3 seconds for care listed under this category. The mean time of 98.3 seconds in Group V was for 7 of the 38 observations which included medications.

TABLE VIII

MEAN TIMES, IN SECONDS, IN RELATION TO THE NUMBER OF OBSERVATIONS AND WEIGHTS OF INFANTS FOR THE CATEGORY OF MEDICATIONS

Group	I	II	III	IV	V
Weight in grams	751-1000	1001-1250	1251-1500	1501-1750	1751-2000
No. of observations	0	9	5	5	7
Mean Time in seconds	- - -	147.4	30.0	111.3	98.3

Considering only the weight variable, the findings within the category revealed no direct relationship between the time spent for administration of medications and the weights of infants receiving the medications. The variation in mean times may have been related to the number of medications administered and the method of administration. The methods of administration observed were oral, topical, and intramuscular. In general, the time spent in preparing and administering intramuscular medications was greater than the time spent for other methods of administration.

Category of Intravenous Fluids. Two observations included the administration of intravenous fluids. The infants were in Group I and received a mean of 120 seconds for nursing care listed under this category. The infants were not only small but unable to maintain a sufficient fluid and caloric intake through oral feedings. The number of observations obtained for this category of care was small. The only apparent relationship to weight was that the care was administered to infants in the smallest weight group.

Category of Miscellaneous Care. The nursing activities in this category of care could not be completely defined before the study was conducted. The activities observed were turning and positioning the infant, reading oxygen concentrations in incubators, placing infants in isolation, assisting doctors with treatments, and changing the infant from an incubator to a bassinet. Activities in the category of miscellaneous care were noted during all observations of direct nursing care. The mean times, in seconds, in relation to the number of observations and weights of infants for the category of miscellaneous care are listed in Table IX.

In the category of miscellaneous care, 3 observations in Group I had a mean time of 24 seconds. In Group II, the 47 observations had a mean of 39 seconds. The mean time for 11 observations in Group III was 40.1 seconds. In Group IV, the 39 observations had a mean time of 34.8 seconds and the mean time for 38 observations in Group V was 46.3 seconds.

In Group V, many of the activities involved frequent changing of the position of premature infants under 48 hours of age and sick

infants, at times other than feeding time. Therefore, the nurse went through the complete preparatory procedure of handwash and gowning which increased the total time spent for care in the category.

TABLE IX

MEAN TIMES, IN SECONDS, IN RELATION TO THE NUMBER OF OBSERVATIONS AND WEIGHTS OF INFANTS FOR THE CATEGORY OF MISCELLANEOUS CARE

Group	I	II	III	IV	V
Weight in grams	751-1000	1001-1250	1251-1500	1501-1750	1751-2000
No. of observations	3	47	11	39	38
Mean Time in seconds	24.0	39.0	40.1	34.8	46.3

Considering the variable of weight, the findings within the category revealed that the time spent in nursing activities of miscellaneous care was not directly related to the weights of infants. There was a trend for the mean time to increase between the smallest and largest weight groups, but there was no general pattern of increase. The variable of condition may have influenced the mean time in Group V.

Total Time for Direct Nursing Care of Infants in Each Weight Group

The total time recorded for direct nursing care included the combined time spent in all nine categories.

In every observation made, it was found that each infant received nursing care in the categories of general care, observation, and

miscellaneous care. The category of feeding was observed among all weight groups, but within two of the weight groups, six infants were not fed during the periods of observation. The nursing care listed under the other categories was not observed in all weight groups nor in all observations in any one weight group.

The mean times, in seconds, in relation to the number of observations and the weights of infants for direct nursing care to infants in the five weight groups are presented in Table X.

The mean time of direct nursing care for 3 observations in Group I was 1,034 seconds. Group I had low mean times for the categories of feeding and miscellaneous care, and no care was observed in the categories of research activities, psychological care, or medications. However, the group had the highest mean for general care and intravenous fluids and a fairly high mean time for the category of observations.

The mean time of direct nursing care for the 47 observations of infants in Group II was 962.8 seconds. The low mean for direct care was influenced by other low mean times in the categories of psychological care, feeding, maintaining respirations and airway, and observations. In addition, no nursing care was observed in the category of research activities.

The mean time for 11 observations of direct nursing care to infants in Group III was 1,097.3 seconds, highest of the means among the five weight groups. In addition, Group III had the high mean for the category of feeding, a fairly high mean for the category of general care, and a great deal of time spent in the category of psychological care.

For the 39 observations of direct nursing care to infants in Group IV, the mean time was 961.5 seconds, lowest of the group means. Also, the group had a low mean for the category of general care, but the mean time for the category of feeding was high. In addition, the mean times for the categories of psychological care, research activities, maintaining respirations and airway, and the administration of medications were greater than the means for other groups.

The mean time of direct nursing care for 38 observations in Group V was 1,054.1 seconds, second high of the group means. At the same time, this group had the low mean for the category of general care and the second highest mean for the category of feeding. The high mean times for the categories of research, observation, and miscellaneous care were also found in this group.

TABLE X

MEAN TIMES, IN SECONDS, IN RELATION TO THE NUMBER OF OBSERVATIONS AND WEIGHTS OF INFANTS FOR DIRECT NURSING CARE

Group	I	II	III	IV	V
Weight in grams	751-1000	1001-1250	1251-1500	1501-1750	1751-2000
No. of observations	3	47	11	39	38
Mean Time in seconds	1,034.0	962.8	1,097.3	961.5	1,054.1

The mean times of direct nursing care for the five groups of infants were fairly close, with a range difference of 135.8 seconds.

The two groups with the highest mean times for direct nursing care, Groups III and V, also had the highest mean times for the category of feeding.

The findings of similar mean times for direct nursing care of premature infants in five different weight groups, ranging from 751 to 2000 grams, would suggest that weight was not a good index for predicting direct nursing care needed. As noted in several of the findings of this study, the range of ages and variety of conditions of infants within the weight groups influenced some phase of nursing care in each category. The resulting mean times for the categories and total direct care showed no general pattern of increase or decrease as the weights of the infants increased.

The findings indicated that the two groups with the highest mean times for direct nursing care, also had the highest means for the category of feeding. A previous finding showed that over 50 per cent of direct care times was spent in the category of feeding. Based on these findings, it would seem that the time required for feeding, as influenced by the age, weight, and condition of the infant, might be one good index for estimating the amount of direct nursing care needed.

Nursing Activities Performed While Giving Direct Care

A total of 2,964 nursing activities were recorded for 138 observations of direct preparation for and the direct administration of nursing care at the bedside of premature infants of varying weights. The mean number of nursing activities, in relation to the number of

observations and weights of infants, performed while giving direct nursing care to infants in the five weight groups are listed in Table XI. The means for the activities are discussed in relation to the type and frequency of nursing activities observed.

Group I had a mean of 22.3 nursing activities for 3 observations of direct nursing care to infants in the group. The mean number of nursing activities for 47 observations in Group II was 22.9. In Group III, 11 observations if direct nursing care had a mean of 23 nursing activities, highest for the five groups. The mean number of nursing activities for 39 observations in Group IV was 19.2 and Group V had a mean of 21.5 nursing activities for 38 observations of direct nursing care.

In the first three groups, the mean number of nursing activities were closely related to the frequency of feedings. With each feeding the nurse would go through the preparatory procedure of handwash, gowning, and assembling equipment from the stand, followed by changing the diaper and giving buttocks care if needed, take the infant's temperature, and then she began the feeding. Therefore, the nursing care of those infants fed at three-hour intervals, as occurred in the first three groups, involved a greater number of nursing activities in the categories of general care and feeding.

Group II, with the second lowest mean time for direct nursing care, had the second highest mean for nursing activities. For Group III, the nursing activities observed in the categories of research activities, psychological care, medications, feeding, and general care,

influenced by three-hour feeding intervals, increased the total number of activities observed. Group III had both the high mean time for direct care and high mean number of nursing activities.

In Group IV, where the mean for nursing activities was the lowest of the five groups, there were fewer activities recorded in the categories of general care, research activities, maintaining respirations and airway, feeding, and miscellaneous care. More of the infants were fed at four-hour intervals; therefore, the activities of general care performed at feeding time and those listed in the category of feeding decreased. The mean time for direct nursing care and the mean number of nursing activities for Group IV were lowest of the group means.

The mean number of nursing activities for Group V was influenced by the activities related to more frequent feedings of the younger infants in the group and the many activities performed in the categories of research, psychological care, maintaining respirations and airway, medications, and miscellaneous care. Group V had the second high mean for direct nursing care time but not the second high mean for nursing activities.

TABLE XI

MEAN NUMBER OF NURSING ACTIVITIES, IN RELATION TO THE NUMBER OF OBSERVATIONS AND WEIGHTS OF INFANTS, PERFORMED WHILE GIVING DIRECT NURSING CARE

Group	I	II	III	IV	V
Weight in grams	751-1000	1001-1250	1251-1500	1501-1750	1751-2000
No. of observations	3	47	11	39	38
Mean Number of activities	22.3	22.9	23.0	19.2	21.5

The findings from the data on nursing activities performed while giving direct nursing care revealed no direct relationship to the weights of infants. There was a continual increase in the means for nursing activities in Groups I, II, and III as the weights of infants increased. This pattern of increase was also noted for the category of feeding. The increase in mean number of nursing activities was not accompanied by a continued increase in mean times for direct nursing care to infants in Groups I, II, and III, although Group III had both the high mean for nursing activities and direct care. Group IV, which received the lowest mean time for direct care, also had the low mean for nursing activities. There were no relationships evident between direct care time and nursing activities for the other groups.

The findings would suggest that an increased number of nursing activities to be performed does not always indicate that there will be an increase in the time spent in direct nursing care. The findings further suggest that weight is not a good index for determining the number of nursing activities which might be performed while giving direct nursing care.

Mean Time for the Total Direct Nursing Care in Relation to All Infants Observed

Using the data obtained in the 138 observations of direct nursing care to premature infants weighing between 751 and 2000 grams, a mean time was determined for the amount of time spent in direct nursing care. Since the data collected on each infant during one observation was obtained over a period of four hours, the mean time stated would be the

average amount of time given to direct nursing care of an infant during the four hours. A total of 137,982 seconds was recorded for 138 observations. The mean time for the 138 observations was 999.9 seconds or 16 minutes and 39.9 seconds of direct care per infant during a period of four hours.

SUMMARY

The data collected from 138 observations of direct nursing care to premature infants grouped into five weight groups, ranging from 751 to 2000 grams, was analyzed by showing the percentage of total time devoted to the nine categories of direct nursing care according to weight groups, and the arithmetic means for: (1) the time spent in each category of direct care, (2) the total time spent for direct care, and (3) the number of nursing activities performed while giving direct care, each mean in relation to the number of observations and weights of infants.

From the findings, there was no general pattern of increase or decrease in the percentages of total time spent in each category of care as the weights of infants increased. The category of feeding utilized over 50 per cent of the direct care time and general care accounted for approximately 32 per cent. Every category seemed to be influenced by the uncontrolled variables of age and condition of infants within a weight group.

The findings for the mean times of the separate categories of direct care, the mean time for total direct care, and the mean number

of nursing activities performed, revealed no general pattern of increase or decrease in the means as the weights of infants increased. There was some evidence of a relationship between the high mean time for the category of feeding and the high mean time for total direct care. There was a relationship between the highest and lowest means in both total direct care and nursing activities for a specific weight group, but the variations between the high and low means showed no relationship.

The findings of the study revealed that the weight of an infant is not a good index for determining the direct care needed. The evidence of a close relationship between the mean time for the category of feeding and total direct care would suggest that the feeding needs of premature infants be assessed more clearly when determining the direct nursing care needed.

CHAPTER VI

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

I. SUMMARY

The problem of this study was to determine whether the direct preparation for and the direct administration of nursing care to premature infants of different weights varied as to the number of nursing activities performed and the amount of time utilized for these activities in relation to the weight of the infant.

The purposes of the study were: (1) to determine whether there were differences in the number of nursing activities performed while giving bedside care to premature infants of varying weights; (2) to determine the amount of time spent in performing these activities in relation to the specific weight of the infant; and (3) to make recommendations based on the data which could be used as one index in determining the number of nursing hours needed by premature infants of varying weights.

The study included observations made on selected infants, weighing between 750 and 2000 grams, who were cared for at the University of Colorado Premature Center. Weight was the only criterion used for the selection of infants. Uncontrolled variables of the study were the condition and age of the infants observed, the number of

smaller infants admitted to the Center for care, variations in the ability, skill, and experience of the nurses providing the nursing care.

Review of the literature revealed few articles on the nursing care of premature infants which discussed the relationship between the weight of the infant and the amount of nursing care given or required. In general, the articles indicated the importance of basing the nursing care on the handicaps of prematurity and their relationship to the weight, age, and condition of the infant.

In 1950, a Program Review of the Colorado Premature Center revealed a large number of smaller infants admitted to the Center which would be reflected in the duration of stay, the type and amount of nursing care required, and cost of care. The authors concluded that a study of nursing time directed toward the care of premature infants was needed.

The normative-descriptive method of study was used to describe the existing situation without imposing control upon factors influencing the situation. Direct observation was the technique used for the collection of data. The cardinal principles of premature care, obtained from review of literature, formed the basis for development of an observation check list of nine categories of care, under which the related nursing activities and recording of time were listed. Repetitive timing was used; each nursing activity was timed separately.

A pilot study was done. Following a minimal revision and the inclusion of a ninth category on research activities, the collection

of the data for the larger study proceeded. Between June 5, 1959 and June 25, 1959, a total of 138 observations of direct nursing care was obtained. The data collected were tabulated under five weight groups for the purpose of analysis. Each group of 250 gram intervals contained observations of direct care to infants.

II. CONCLUSIONS

The data collected from the 138 observations were first analyzed by determining a percentage distribution of the total nursing time utilized in the nine categories of direct care for each weight group. There were variations among the percentage figures obtained. The findings did not reveal a general pattern of increase or decrease in the percentage of total time utilized for each category in relation to the increase in weights of infants. Each category seemed to be influenced by the uncontrolled variables of age and condition of the infants within each weight group.

General care accounted for approximately 32 per cent of the direct nursing care time. There was a trend toward a decrease in the percentage of total time given to general care as the weights of infants increased. First inspection of the data seemed to indicate that the weight of the infant might be used for determining the amount of time needed for general care. However, a closer examination revealed that the activities of this category were closely related to the category of feeding.

The category of feeding utilized over 50 per cent of the direct nursing care time. Findings revealed that infants weighing between

1001 and 1750 grams required the greatest percentage of direct nursing care time given to feeding.

The data further revealed that the greater percentage of total time spent in the categories of research activities and psychological care was spent with older infants in the two larger weight groups.

The percentage of total time utilized in the categories of maintaining respirations and an airway, medications, intravenous fluids, observations, and miscellaneous care varied among the weight groups and showed no direct relationship to the weights of infants. Time required appeared to be more closely related to the age and condition of the infants.

The data were also analyzed by calculating arithmetic mean times for the nine categories of direct care. The widest variations in range of mean times for categories of care observed in all weight groups were in the categories of observations, miscellaneous care, and feeding. The findings for the mean times in the nine categories of care revealed no general pattern of increase or decrease in the means as weights of infants increased.

The mean times for general care did tend to decrease as weights of infants increased, but appeared to be closely related to feeding. The mean times for feeding did increase through the first three weight groups as the amount of formula given at one feeding and the frequency of feedings increased. The mean decreased with the change to less frequent feedings and fewer infants with feeding difficulties. The mean times for feeding appeared to be influenced by the amount of

formula given at one feeding, the method and frequency of feedings, and difficulties encountered. Sick infants took longer to feed.

There were variations among the five weight groups in mean times for the categories of research activities, psychological care, medications, intravenous fluids, maintaining respirations and airway, observations, and miscellaneous care. The number of activities performed and the amount of time spent in giving the care listed under these categories appeared to be directly related to the age and condition of the infant.

The data further revealed variations in the mean times for total direct care of the five weight groups, but there seemed to be no direct relationship to the increase in weights of infants. The means ranged from 961.5 to 1097.3 seconds. Groups III and V (1251-1500 grams and 1751-2000 grams) had first and second high means, respectively, for both total nursing time and the category of feeding. However, Group IV, with the lowest mean for total nursing time did not have the lowest mean time for the category of feeding. The length of time spent in feeding influenced the total nursing care time, although the effect was not always proportionate.

An analysis of the mean number of nursing activities performed while giving direct nursing care indicated that the means appeared to be most influenced by feeding and general care activities which occurred at feeding time. The means ranged from 19.2 to 23 activities per observation of direct care. Group IV had the lowest mean number of activities. Group III had the high means for nursing activities and total nursing time. Group IV had the low means for both total direct

care and nursing activities. The variations in the other weight groups showed no direct relationship between total direct care time and the number of activities performed.

The findings in this study revealed that the weight of the infant was not a good index for determining the direct nursing care time given or needed. There were variations in the mean number of activities performed and the mean amount of time utilized for these activities among the five weight groups, but the variations showed no general pattern of increase or decrease as the weights of infants increased.

III. RECOMMENDATIONS

As a result of the study, the following recommendations are made:

1. It is suggested that the weight of the infant not be used as a single index for determining direct nursing care but be considered in conjunction with the age and condition of the infant.

2. It is recommended that further studies be done in which the variables of weight, age, and condition are controlled.

3. On the basis of the close relationship between the high mean times for feeding and total direct care, it is recommended that the feeding needs of premature infants be studied to determine whether they would be a suitable index for planning the amount of nursing care needed.

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APPENDIX A

OBSERVATIONAL CHECKLIST

Date and time
Condition
Age
Weight

I GENERAL CARE	Descrip.															
1. Prep. for activity																
2. Handwash																
3. Gown																
4. Take temp.																
5. Change diaper																
6. Buttocks care																
7. Apply Ointment																
8. Prep. for exposure																
9. Remove shirt																
10. Adjust scale Weigh																
11. Bath Sponge																
Tub																
12. Dress																
13. Change linen																
14. Damp dust																
15. Remov. equip.																
16. Ungown																
17. Record																
18. Other																
II RESEARCH ACT.																
1. Prep. for activity																
2. Handwash																
3. Gown																
4. Change net																
5. Col. Spec.																
6. Cleanse baby																
7. Ungown																
8. Other																

	Date and time																
	Condition																
	Age																
	Weight																
III	PSYCHO. CARE	Descrip.															
	1. Physical cont. Hold, pat, rub																
	2. Verbal Talk,sing,etc.																
	3. Other																
IV	FEEDING																
	1. Prep. for activity																
	2. Handwash																
	3. Gown																
	4. Lavage																
	5. Feed a. Bottle																
	b. Gavage																
	c. Cup																
	d. Dropper																
	6. Remov. equip.																
	7. Ungown																
	8. Record																
	9. Other																
V	MAINTAINING RESPIRATIONS AND AIRWAY																
	1. Handwash																
	2. Gown																
	3. Stimulation Hand rock																
	Mechanical																
	4. Adm. Med.																
	5. Suction nose-throat	Bulb De Lee															
	6. Ungown																
	7. Record																
	8. Other																

	Date and time																
	Condition																
	Age																
	Weight																
VI	OBSERVATION	Descrip.															
	1. Handwash																
	2. Gown																
	3. Count Pulse																
	Resp.																
	4. Observ. Baby No activity																
	5. Ungown																
	6. Record																
	7. Other																
VII	MEDICATIONS																
	1. Prep.																
	2. Handwash																
	3. Gown																
	4. Administer O																
	Op																
	IM																
	5. Ungown																
	6. Other																
VIII	INTRAVENOUS																
	1. Prep																
	2. Handwash																
	3. Gown																
	4. Assist Dr.																
	5. Count gtts																
	6. Reg. I.V.																
	7. Ungown																
	8. Other																

Date and time

Condition

Age

Weight

IX MISCELLANEOUS	Descrip.															
1. Handwash																
2. Gown																
3. Change position																
4. Read O_2 concent.																
No. of babies per nurse																
Size of babies																

CONVERSION OF POUNDS AND OUNCES TO GRAMS

Ounces	1 Lb.	2 Lb.	3 Lb.	4 Lb.	5 Lb.
	Gm.	Gm.	Gm.	Gm.	Gm.
0	454	907	1361	1814	2268
1	482	936	1389	1843	2296
2	510	964	1418	1871	2325
3	539	992	1446	1899	2353
4	567	1021	1474	1928	2381
5	595	1049	1503	1956	2410
6	624	1077	1531	1985	2438
7	652	1106	1559	2013	2466
8	680	1134	1588	2041	2495
9	709	1162	1616	2070	2523
10	737	1191	1644	2098	- - -
11	765	1219	1673	2126	- - -
12	794	1247	1701	2155	- - -
13	822	1276	1729	2183	- - -
14	851	1304	1758	2211	- - -
15	879	1332	1786	2240	- - -

APPENDIX C

RAW DATA FOR FIGURES 1 AND 2

RAW DATA FOR FIGURE 1

PERCENTAGE OF TOTAL TIME UTILIZED IN
DIRECT PREMATURE NURSING CARE
DURING 138 OBSERVATIONS

Category	All groups 751 - 2000 grams	
	seconds	per cent
General Care	44,042.5	31.9
Research Activities	2,440.0	1.7
Psychological Care	1,716.0	1.3
Feeding	77,853.0	56.4
Maintaining Respirations and Airway	657.5	.5
Observations	2,956.0	2.1
Medications	2,611.0	1.9
Intravenous Fluids	240.0	.2
Miscellaneous Care	5,466.0	4.0
Total Time	137,982.0	100.0

RAW DATA FOR FIGURE 2

PERCENTAGE OF TOTAL TIME UTILIZED IN NINE CATEGORIES OF DIRECT NURSING CARE IN EACH PREMATURE INFANT WEIGHT GROUP

Category	Group I 751 - 1000 grams		Group II 1001 - 1250 grams		Group III 1251 - 1500 grams		Group IV 1501 - 1750 grams		Group V 1751 - 2000 grams	
	seconds	per cent	seconds	per cent	seconds	per cent	seconds	per cent	seconds	per cent
General Care	1,068.0	34.4	15,587.0	34.4	3,654.0	30.3	12,434.0	33.2	11,299.5	28.2
Research Activities	---	---	---	---	70.0	.6	202.0	.5	2,168.0	5.4
Psychological Care	---	---	60.0	.2	330.0	2.7	470.0	1.3	856.0	2.1
Feeding	1,603.0	51.7	26,040.0	57.5	7,444.0	61.6	21,241.5	56.6	21,524.5	53.7
Maintaining Respirations and Airway	50.0	1.6	30.0	.1	---	---	345.0	.9	232.5	.6
Observations	70.0	2.3	374.0	.8	71.0	.6	891.0	2.4	1,550.0	3.9
Medications	---	---	1,326.5	2.9	60.0	.5	556.5	1.5	668.0	1.7
Intravenous Fluids	240.0	7.7	---	---	---	---	---	---	---	---
Miscellaneous Care	72.0	2.3	1,835.0	4.1	441.0	3.6	1,359.0	3.6	1,759.0	4.4
Total Time	3,103.0	100.0	45,252.5	100.0	12,070.0	100.0	37,499.0	100.0	40,057.5	100.0